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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/890,860	10/16/2001	Keith Herbert Dodd	899-26	7954

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EXAMINER

AUGHENBAUGH, WALTER

ART UNIT	PAPER NUMBER
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1772

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DATE MAILED: 11/22/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application N .	Applicant(s)	
	09/890,860	DODD ET AL.	
	Examiner	Art Unit	
	Walter B Aughenbaugh	1772	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____ .
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) 20 and 21 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____ .
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 8-07-01
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____ .
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____ .

DETAILED ACTION

Election/Restrictions

1. Restriction is required under 35 U.S.C. 121 and 372.

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1.

In accordance with 37 CFR 1.499, applicant is required, in reply to this action, to elect a single invention to which the claims must be restricted.

Group I, claim(s) 1-19, drawn to a heat transfer element.

Group II, claim(s) 20-21, drawn to a process for the production of a heat transfer element.

2. Evidence of lack of unity between groups I and II is found in US 5,211,220 to Swozil et al. wherein it is found to disclose the features of instant claim 1. As such, the special technical features of the claimed invention are not found to define a contribution over the prior art under PCT Rule 13.2.

3. During a telephone conversation with Bryan H. Davidson on November 7, 2002 a provisional election was made with traverse to prosecute the invention of Group I, claims 1-19. Affirmation of this election must be made by applicant in replying to this Office action. Claims 20-21 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

4. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the

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application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

5. Applicant is advised that the reply to this requirement to be complete must include an election of the invention to be examined even though the requirement be traversed (37 CFR 1.143).

Specification

6. This application does not contain an abstract of the disclosure as required by 37 CFR 1.72(b). An abstract on a separate sheet is required.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claims 1-3, 11, 13-15 and 17 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In regard to claims 1 and 14, the phrase “the fibrous material comprising from about 20%...as thermally conductive material” is indefinite; the phrasing is awkward. It is unclear whether the glass fibers make up 20-60% of the volume of the heat transfer element, or if the glass fibers make of 20-60% of the fibrous material. It is also unclear what is intended to be claimed as “thermally conductive material”.

In regard to claim 2, the phrase “in the form of a sheet” does not positively recite any structure for the heat transfer element.

In regard to claim 3, while the intended structure to be claimed is clear, the phrase “in the form of” does not positively recite any structure for the heat transfer element.

In regard to claim 11, the structure intended to be recited by the limitation “rovings plaited to form” is unclear. Furthermore, the limitations “formed into tapes” and “woven into panels” do not positively recite any structure. The claim should positively set forth the purpose of the “tapes” and “panels” and the structure necessary for carrying out the purpose, i.e., the claim is incomplete in regard to the structure of the “tapes” and “panels”.

In regard to claim 13, the phrase “the individual rovings extend” is indefinite because the structure intended to be recited by “extend” is unclear.

In regard to claim 15, “underneath” is indefinite because a frame of reference is not provided that may be used to determine the structure intended to be recited by “underneath”.

In regard to claim 17, “PVDF” must be written out in full.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

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4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

10. Claims 1-3, 7, 10-13, 14 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Swozil et al.

In regard to claims 1-3 and 14, Swozil et al. teach a tube heat exchanger comprising a tube body layer formed of a fluorine-containing polymer, and a layer of carbon fibers or glass fibers that are coated with perfluorinated alkoxypolytetrafluoroethylene (PFA) or polyvinylethertetrafluoroethylene copolymer (TFA) (col. 1, lines 39-44, col. 3, lines 1-18 and col. 3, lines 51-60). Swozil et al. teach that the fibers provide rigidity to the tube heat exchanger. The PFA or TFA is coated onto the fibers, and thus serves as the polymer matrix for the fibers, and provides strong bonding between the fluoropolymer tube body layer and the fibers (col. 3, lines 57-61, col. 4, lines 26-29 and col. 4, lines 54-62). As Swozil et al. teaches the use of glass fibers in tube heat exchangers, glass fibers are necessarily thermally conductive.

Swozil et al. fail to teach that the glass fibers comprise from about 20% to about 60% by volume of the heat transfer element.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have determined the optimum amount of glass fiber in terms of percentage volume of the heat transfer element to use in the heat exchange element of Swozil et al. that would yield the desired rigidity of the element depending on the desired end user result, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art in the absence of unexpected results. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

In further regard to claim 2, the dual layer tube heat exchanger of Swozil et al. is interpreted by Examiner to be in a tubular sheet form, see 35 USC § 112 rejection to claim 2.

In further regard to claim 14, the tube heat exchanger of Swozil et al. does indeed comprise a PFA or TFA polymer sheet having glass fibers interspersed therein as discussed above. The limitation "polymer sheet" is the only limitation of claim 14 that differentiates claim 14 from claim 1.

In regard to claim 7, Swozil et al. teach that the fibers are resistant to corrosive substances (col. 3, lines 1-9), and are therefore chemically resistant.

In regard to claims 10, the fibers of Swozil et al. are continuous fibers since they are either wrapped around the tube body layer or formed into a mesh sleeve with covers the tube body layer (col. 3, lines 19-50).

In regard to claim 11, Swozil et al. teaches the configuration of the fibers in a fabric mesh sleeve with a diameter which corresponds approximately to the diameter of the tube (col. 3, lines 26-34). Swozil et al. does not explicitly teach that the glass fibers are configured in rovings plaited to form continuous tubes, tapes or panels. However, one of ordinary skill in the art would have recognized that a fabric mesh sleeve would consist of the glass fibers intertwined as plaited fibers (i.e. plaited rovings) would be intertwined. Furthermore, the fabric mesh sleeve forms a continuous tube. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have intertwined the fibers of Swozil et al. to form a continuous tube as taught by Swozil et al.

In further regard to claim 11, the limitations "plaited to form", "formed into tapes" and "woven into panels" are process limitations and have not been given patentable weight.

In regard to claim 12, the fibers (i.e. rovings as claimed) of Swozil et al. are indeed coated with a plastics material, PFA or TFA, as discussed above. Furthermore, the term “precoated” introduces a process limitation into the claim that is not given patentable weight since the method of forming the heat transfer element is not pertinent to the patentability of the heat transfer element itself.

In regard to claim 13, Swozil et al. teach that larger mesh widths promote bonding between the fibers and the tube body layer (col. 3, lines 29-39); therefore, Swozil et al. teach that the fibers are loosely comingled. Swozil et al. also teach that the fibers are oriented cross-wise at an angle of approximately 60° on the tube body. Swozil et al. fail to teach that the fibers extend at an angle of about 10° to about 15° to the tube axis. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have determined the optimum angle to orient the fibers relative to the tube axis of the tube body of Swozil et al. that would yield the desired rigidity of the element depending on the desired end user result, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art in the absence of unexpected results. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

In regard to claim 17, Swozil et al. teach that polyvinylidene fluoride is a known fluorine-containing polymers used in tube heat exchanger tubes (col. 1, lines 14-20).

11. Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Swozil et al. in view of O'Connor.

Swozil et al. teach the heat transfer element as discussed above. Swozil et al. fail to teach that the heat transfer element further comprises metal fibers interspersed therein where the metal

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fibers are iron, steel or stainless steel fibers. O'Connor, however, disclose that suitable materials for the reinforcement of thermoplastic materials are glass fibers and metal fibers such as iron fibers or a mixture of glass fibers and metal fibers (col. 3, lines 25-31).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used metal fibers such as iron fibers in combination with the glass fibers of Swozil et al. as a reinforcing agent, since it is notoriously well known to use a combination of glass and metal fibers as reinforcing agents of thermoplastic material as taught by O'Connor.

12. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Swozil et al. in view of Kolouch.

Swozil et al. teach the heat transfer element as discussed above. Swozil et al. fail to teach the inclusion of metal particles dispersed in the polymer matrix. Kolouch, however, disclose that metal powders and granules are suitable fillers for increasing the thermal conductivity of fluoropolymers (col. 4, lines 4-6).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have included metal particles in the fluoropolymer (PLA or TLA) matrix of Swozil et al. in order to increase the thermal conductivity of the fluoropolymer as taught by Kolouch.

13. Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Swozil et al. in view of Bruning et al.

Swozil et al. teach the heat transfer element as discussed above. Swozil et al. fail to teach the mixture of fibers of a plastic material with the glass fibers where the plastic is polypropylene or fluoropolymer. Bruning et al., however disclose a semifinished tape stock product consisting of glass reinforcing fibers and thermoplastic fibers such as polypropylene (col. 1, lines 12-20,

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col. 5, lines 10-18 and col. 6, lines 15-22). One of ordinary skill in the art would have recognized to have mixed a plastic fiber with the glass fiber of Swozil et al. and to have used this fiber mixture as the fibrous material of Swozil et al., since it is known to use a mixture of plastic and glass mixtures as a semifinished stock product as taught by Bruning et al.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have mixed a plastic fiber with the glass fiber of Swozil et al. and to have used this fiber mixture as the fibrous material of Swozil et al., since it is known to use a mixture of plastic and glass mixtures as a semifinished stock product as taught by Bruning et al.

14. Claims 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Swozil et al. in view of Saito et al.

Swozil et al. teach the heat transfer element as discussed above. Swozil et al. fail to teach that an intermediate layer of a plastics material is provided underneath the outer fluoropolymer surface of the element where the plastics material comprises an acrylic polymer. Saito et al., however, disclose a heat exchange element where an acrylic resin coating layer is formed on the glass fiber sheet, where the coating serves as a binder and further comprises an acid resistant inorganic filler (col. 12, lines 17-28). One of ordinary skill in the art would have recognized to have added an intermediate layer of a mixture of an acrylic resin and an inorganic filler between the tube body layer and the glass fiber layer of Swozil et al. in order to serve as a binder layer which enhances the bond between the tube body layer and the glass fiber layer and in order to enhance the chemical resistance of the layer by way of the inorganic filler as taught by Saito et al.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have added an intermediate layer of a mixture of an acrylic resin and an inorganic filler between the tube body layer and the glass fiber layer of Swozil et al. in order to serve as a binder layer which enhances the bond between the tube body layer and the glass fiber layer and in order to enhance the chemical resistance of the layer by way of the inorganic filler as taught by Saito et al.

15. Claims 18 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Swozil et al. in view of Yousuf et al.

Swozil et al. teach the heat transfer element as discussed above. Swozil et al. fail to teach that the fluoropolymer is mixed with another thermoplastic polymer, where the other thermoplastic polymer is an acrylic polymer. Yousuf et al., however, disclose a mixture of polyvinylidene fluoride with an acrylic polymer (col. 9, lines 31-36) that yield unusually good flow and levelling characteristics (col. 2, lines 1-6).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a mixture of polyvinylidene fluoride and an acrylic polymer as the tube body layer of Swozil et al. in order to achieve unusually good flow and levelling characteristics as taught by Yousuf et al.

Conclusion

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Walter B Aughenbaugh whose telephone number is 703-305-4511. The examiner can normally be reached on Monday-Friday from 9:00am to 5:00pm.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Harold Pyon, can be reached on 703-308-4251. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9310.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

WBA wba
11/15/02



**WILLIAM P. WATKINS III
PRIMARY EXAMINER**